Station ICM team completes first milestone

By Nicole Cloutier

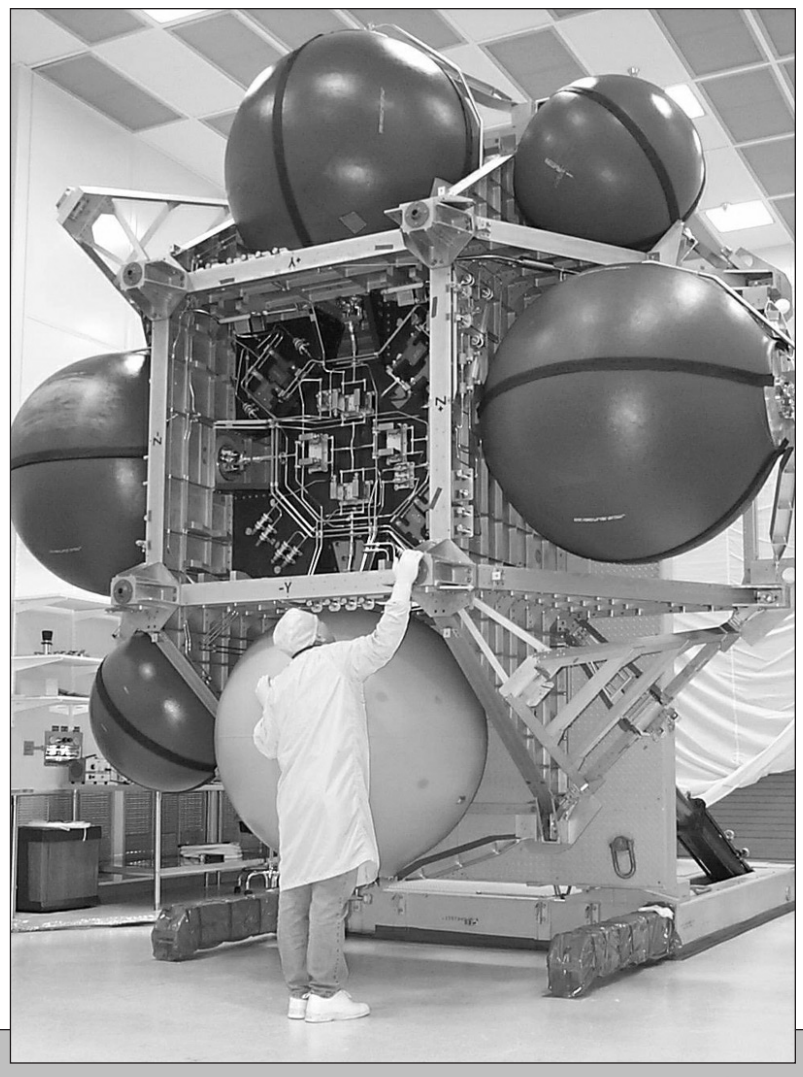
Flight controllers for the Interim Control Module, in conjunction with Electronic Systems Test Laboratory and Naval Research Laboratory engineers, recently completed successful testing of MCC-Houston's ICM commanding capability. ICM is a contingency propulsion module for the ISS that's being designed and built by the NRL in Washington, D.C. The ICM will provide attitude control and reboost capabilities for the International Space Station.

"This was the first integrated test for the ICM communication system and a lot was accomplished," said Brian T. Smith, ICM flight controller and MOD lead for the test. "It was a very well orchestrated test."

Although the team completed a battery of smaller tests with both NRL and the ESTL in the months before to prepare for the test, this was the first time controllers tied in MCC with the tracking and data relay satellite system and "talked" to the ICM. Teams from MOD, NRL, Goddard Space Flight Center, and White Sands Complex all participated in the week long test to try out the independent command system.

"The command system used by the ICM in the MCC is completely independent of the existing command system used by the ISS or shuttle," said Bryan Lunney, group lead of ISS Motion Control Systems. "In fact many things about the ICM are quite unique."

The ICM is actually a modified version of the Shuttle Launch Dispenser, a shuttle-deployed propulsion system originally designed by engineers at the NRL for the National Reconnaissance Office. In the late 80s, the SLD was reconfigured for launch on a Titan launch vehicle and renamed the Titan Launch Dispenser. Some of its characteristics have been changed due to NASA's human space program. For instance, to adapt to ISS's changing center of gravity and mass, the ICM uses a three-axis stabilization system versus the spin-stabilization designed in the earlier version. Because of that, the team also needed to incorporate propellant management devices for the tanks. And to meet the human space program redundancy requirements, a new command and control architecture was developed and incorporated.



A Naval Research Lab engineer inspects the Interim Control Module, a contingency propulsion component for the ISS.

"Within MCC the biggest difference is the ICM's dedicated front end processor and command system," said Eric Gallagher, ICM flight controller for the Command Telemetry and Data Handling system. "Additionally, unique MCC hardware and software tools have been acquired to support ICM's capability to process stored command sequences."

Another difference with the ICM is that controllers need to be knowledgeable with all of the subsystems, not specialized for one subsystem exclusively as with the station program.

"The cross training is fairly unique in the flight control world," added Smith. "An ICM controller will have the opportunity to learn many subsystems and fly them all at the same time. It's a challenge, but it's also what attracted each person to come work on the ICM."

JSC has a core team of 10 flight controllers working on ICM, but that number is expected to grow by the end of the year. ICM could fly as early as 2A.3 and to meet that timeline, members from JSC's ICM flight controller team rotate to the NRL for two-week tours of duty.

Kevin Metrocavage and Kristin Geeza, both of the ISS Motion Control Systems Group, have been resident at NRL in Washington, D.C. for the past few months as the ICM flight controller representatives for MOD.

"It's been a real education for me personally, and for our team," notes Metrocavage, also ICM propulsion lead. "By being up at NRL, it's given us the opportunity to have some good 'hands-on' experience with how the hardware operates. I'm really looking forward to this fall when the ICM subsystem functionality testing is in full swing."

"Typically, you're pretty well divorced from the engineers who build the systems," said Smith of the current arrangement. "But on this project we actually sit with the NRL engineers in the lab, in their meetings with them while they discuss problems, ideas or ways to make the ICM safer and that is where we get a lot of our knowledge."

Likewise, it's rare that the engineers who design systems actually play a part in the product's actual manufacture, but at the NRL, you'll find the JSC design engineers are helping to build the ICM at the site.

Lee Graham, the NASA deputy project manager resident at NRL, has seen the daily efforts of the working relationship between NASA and NRL.

"Both sides of this partnership have a very strong drive for mission success and both sides have developed a solid respect for the other. A lot of people, and especially the MOD folks working the ICM, have had a direct and significant contribution to this. An added benefit of the NASA and NRL partnership, as many people have already said, is that you get to see and work the whole gamut here from design, to build, to integration, to test and, finally, to operation. Nothing can match being right there with the flight vehicle as it progresses towards flight."

The ICM team is now concentrating their efforts towards its first vehicle level end-to-end test scheduled for December 1999. Following the end-to-end test, the ICM will be shipped to the Kennedy Space Center in early 2000 where it will undergo additional testing and integration. The ICM is currently scheduled for launch no earlier than August 2000 pending the availability of the Russian Service Module. ■

JSC Photo S99-10462 by James Blair

The Interim Control Module provides a unique project for JSC engineers partnering with the Naval Research Laboratory. Shown here are JSC team members standing, from the left, Mike Hamilton, Randy Hubbard, Sheik Alli, Kevin Metrocavage, Mike Lammers, Rob Alexander, and John Bendle. Seated from the left are Brian Smith, Eric Gallagher, Stan Siemienski, and David Randall.

Not shown are Mark Jenkins, Kristin Geeza, Bruce Powers, Adam Dershowitz, Stein Cantrell-Avlos, Bretty Maryott, Robert Frost, and Molly Meyer.

Chill out at work

AVOIDING STRESS

Automation, Robotics & Simulation Division Managers, from left, Henry Kaupp, Charley Price, Charles Gott and Andre Sylvester dress up like Bill Chill to avoid stress.